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United States
Department of
Agriculture

Forest
Service

**Forest Pest
Management**

Washington, D.C.

Weeds, Trees, and Herbicides

A Public Forest and Rangeland Survey

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PREFACE

This report summarizes data on weeds and weed control with herbicides for 1984. The information was collected during 1985 by means of survey forms sent to Federal and State forest and rangeland managers in the United States, Guam, and Puerto Rico. The material was gathered by the USDA Forest Service in cooperation with the Agricultural Research Service.

This report was prepared by Forest Pest Management, State and Private Forestry, Forest Service, U.S. Department of Agriculture, P.O. Box 2417, Washington, DC 20013. The assistance provided by Frederick W. Honing and David E. Alligood in preparing this report is gratefully acknowledged.

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SUMMARY

Respondents to the survey analyzed in this publication provided data on current distributions of weeds and on weed control using herbicides on lands they managed. They also estimated trends of weeds inadequately controlled at present and indicated specific needs for better control technology.

The survey indicated that in forestry the following weeds will continue to be significant, judged by current infestation patterns and difficulty of control: grasses, ceanothus, purslane, bindweed, alder, nutsedge, kudzu, pigweed, leafy spurge, and Canadian thistle.

On rangeland significant weeds are leafy spurge, thistles, knapweeds, rabbitbrush, and tansy ragwort.

Noncropland associated with public lands face problems with sassafras, persimmon, Canadian thistle, kudzu, Johnsongrass, and leafy spurge.

Where crops are grown on public lands to enhance wildlife habitat or maintain historic settings a number of weeds have resisted control: Johnsongrass, cocklebur, bindweed, cheatgrass, foxtail, and Canadian thistle.

Forest managers report as important newer herbicides: glyphosate, hexazinone, oxyflourfen, and triclopyr. They continue to use 2,4-D and picloram, but request new technology in the form of better chemical, biological, and integrated pest management techniques.

Rangeland managers expect to continue the use of 2,4-D, picloram, glyphosate, dicamba, tebuthiuron, and combinations of these. New technology is sought in biological controls and combinations of techniques in integrated pest management.

Cropland weeds show resistance to control even when atrazine, 2,4-D, trifluralin, glyphosate, and alachlor re used. Consequently, land managers would like improved technology, especially in the areas of chemical and biological control.

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PURPOSE

In 1985 the USDA Forest Service (FS) agreed to cooperate with the Agricultural Research Service (ARS) in collecting data for a revision of a publication entitled "Extent and Cost of Weed Control with Herbicides and an Evaluation of Important Weeds, 1968" (ARS-H-1). ARS-H-1 has been used in planning, funding, and directing vegetation management programs in the United States for the past 17 years. The revision was considered necessary because of numerous changes in the information since the last edition. This report summarizes data collected on State and Federal forest and rangeland by the Forest Service.

SURVEY FORMS AND THEIR DISTRIBUTION

The task of the FS was to gather data on weeds and herbicides important to Federal and State forest and rangeland management. Survey forms (Figure 1) were sent to all State Foresters in the U.S., Guam, and Puerto Rico. Forms were also sent to the administrators of selected Federal land management agencies which are listed in Table 1. Although all Federal land managers using herbicides were not surveyed, the data collected represents about 99 percent of Federal land area. A total of 531 forms were returned to the FS. They provide data on a wide variety of land management activities on Federal and State lands.

DATA COLLECTION AND ANALYSIS

Initially an effort was made to determine total acreage affected by weeds and treated with herbicides. This proved impossible because of the great variety of management practices used by Federal and State land managers in different geographic areas. For instance, an acre of corn grown for wildlife purposes in a game preserve is managed quite differently from an acre of corn grown for human or domestic animal consumption. Similarly, an acre of woodland in the southeast is managed in a different way from an acre of trees in the northwest. Further, given a million acres of National Forest land, only half may be actually under "management," and of this half, only 500 acres may be treated in any one year. In some instances considerable acreage is unavailable for treatment because of legislative mandates or agency policy. For instance, in designated Wilderness Areas and in some National Parks certain management practices are restricted oreven prohibited.

There is another consideration that makes the analysis of acreages confusing and causes simple mathematical calculations of them to be misleading. Of the millions of acres of National Forest System (NFS) land, only about one-tenth of one percent is treated with herbicides each year. Dividing total NFS acreage by the amount of herbicide used results in a figure that greatly understates the benefits of herbicide use. This is generally true of all Federal lands as well as forested State and private land; so this summary does not include percentages of acreage treated. It does provide data, state by state, on total land acreage, total Federal land area, rangeland, forest land, and commercial forest land by ownership (Table 2).

The significance of weeds and the importance of herbicides on this acreage in these categories is highly variable. The following tables should, however, provide some insights into the extent and kinds of weeds in the U.S. and the herbicides used in their control.

Figure 1

WEED SURVEY FOR 1984

REPORTED BY (1)_____ STATE_____

DEPARTMENT/AGENCY (2)_____ CROP OR AREA (3)_____

PHONE NUMBER ( ) -_____ ACREAGE (4)_____

(1) Please use last name first followed by initials.
(2) Give complete abbreviations, e.g. USDI-BLM.
(3) Survey sheets are provided for important crops in your State. Extras are provided in case of omissions, etc. See appendix C for area designations.
(4) If not provided, please insert number of acres and give source of information.

A. List up to 5 individual herbicides or herbicide combinations used most widely (Use WSSA common names given in Appendix B)

Herbicide or Combination (5)	% Crop Acreage Treated	Average Application Rate-lb/A (6)	Expected Use Trend (7)
1.			
2.			
3.			
4.			
5.			

(5) Combinations include formulated mixes and tank mixes. Write as X + Y.
(6) Active ingredient basis. For multiple applications, put number of applications in parentheses following rate, e.g 3 (2). For combinations, write as 1 + 2. Put number of applications in parentheses following rate, e.g. 1 + 2 (2).
(7) Use 1 = stationary, 2 = up, 2 = down.

B. List up to 5 weeds which are inadequately controlled with available technology. (Priority Order) - (Use common names given in Appendix A)

Weed	% Acreage Infested	Intensity Trend (8)
1.		
2.		
3.		
4.		
5.		

(8) Trend in weed-stand desnity since 1980. Use 1 = stationary, 2 = up, 3 = down.

(over)

C. Assessment of Weed Control Technology

	Current Practice % of acres (9)	Need for Better Technology Use 1-10 Rating (10)
1. Conservation tillage (practices which both minimize soil distrubance and leve surface residue)		
2. No-till (means no distrubance from harvest to next planting, includes strip planting, i.e. tilling only row at planting and ridge planting, i.e. forming and planting on a ridge)		
3. Mechanical (cultivating, hoeing, mowing, brush cutting, etc.)		
4. Cultural (fertilization, crop rotation, grazing management, etc.)		
5. Chemical		
6. Biological (includes use of parasites, predators, and pathogens only)		
7. Integrated Weed Management (systems where two or more weed control technologies used in combination)		
8. List and rate other weed technology needs (e.g. application equipment)		
a.		
b.		
c.		
d.		

(9) Proportion of acres practice now used on.
(10) Scale 1-10; 1 = not necessary or not applicable to 10 urgent.

If questions arise, please call Fred Honing or
Dennis Hamel (703) 235-8209

Please complete and return by March 15, 1985

Table 1. Federal Land Management Agencies.

Surveyed Federal Agencies	Acreage Administered[1] (Thousands)
USDA - Forest Service	192,074
Department of Energy - Bonneville Power Administration	14
Tennesee Valley Authority	1,010
Department of the Interior:	
Bureau of Indian Affairs	3,017
Bureau of Land Management	341,059
Fish and Wildlife Service	84,907
National Park Service	77,286
Department of Defense	22,888
Subtotal	722,255
Other Federal Agencies[2]	7,566
Grand Total	729,821

[1]Data from "Public Land Statistics - 1983", U.S. Department of the Interior, Bureau of Land Management, April 1984.

[2]In sending out survey forms to Federal land management agencies no attempt was made to contact all herbicide users. The agencies contacted represent 99 percent of the Federal land management area. The Bureau of Reclamation (which administers over 4 million acres) was not contacted but should be considered for future updates. A good summary of weeds associated with Bureau of Reclamation lands appears in their Herbicide Manual (See References).

Table 2. Land Areas (in thousands of acres) and Ownerships by State.

State	Total Land Area[1]	Federal Land Area[1]	Range Land Area[2]	Forest Land Area[2]	Commercial Forest Land[3,4]				
					NFS	State	Ind.	NIPF	Total
Alabama	32,491	1,141	54	21,361	618	391	4,205	16,119	21,333
Alaska	365,333	327,029	231,472	119,145	6,528	4,333	.2	289	11,150
Arizona	72,645	29,195	45,168	18,494	2,462	1,268	0	166	3,896
Arkansas	33,330	3,404	.2	18,282	2,414	560	3,951	11,282	18,207
California	100,031	47,526	43,040	40,152	8,168	507	2,687	4,941	16,303
Colorado	66,301	23,950	27,822	22,271	7,505	691	15	3,104	11,315
Connecticut	3,118	9	0	1,861	0	147	0	1,659	1,806
Delaware	1,236	41	0	392	0	14	30	340	384
Florida	34,658	3,652	2,189	17,040	1,005	1,110	5,319	7,896	15,330
Georgia	37,156	2,281	0	25,256	813	732	4,318	18,949	24,812
Hawaii	4,112	787	968	1,986	0	454	0	494	948
Idaho	52,744	34,282	23,598	21,727	9,153	1,367	947	2,074	13,541
Illinois	35,613	626	.3	3,810	227	53	17	3,396	3,692
Indiana	22,996	529	3	3,943	162	248	27	3,378	3,815
Iowa	35,818	228	38	1,561	0	113	17	1,330	1,460
Kansas	52,338	733	16,278	1,344	0	37	0	1,150	1,187
Kentucky	25,388	1,418	0	12,161	589	307	255	10,751	11,902
Louisiana	28,493	1,157	517	14,558	560	443	3,761	9,763	14,527
Maine	19,837	136	.4	17,718	37	504	8,083	8,240	16,864
Maryland	6,296	210	84	2,653	0	243	139	2,140	2,523
Massachusetts	5,007	85	.1	2,952	0	365	30	2,401	2,798
Michigan	36,450	3,533	.4	19,270	2,401	4,018	2,257	10,102	18,778
Minnesota	50,911	3,449	156	16,709	1,715	5,613	772	5,595	13,695
Mississippi	30,229	1,749	20	16,716	1,122	554	2,996	11,832	16,504
Missouri	44,125	2,254	1,448	12,876	1,246	286	362	10,393	12,289
Montana	93,048	27,468	53,334	22,559	8,162	1,632	1,055	3,510	14,359
Nebraska	49,052	696	24,274	1,029	41	38	0	710	789
Nevada	70,332	57,383	56,888	7,683	61	5	8	60	134
New Hampshire	5,756	738	0	5,014	459	121	947	3,165	4,692
New Jersey	4,780	146	61	1,928	0	319	16	1,522	1,857
New Mexico	77,654	25,862	48,726	18,060	2,817	792	0	1,927	5,538
New York	30,321	249	2	17,218	0	892	1,177	12,174	14,243
North Carolina	31,260	2,169	0	20,043	1,029	734	2,135	15,665	19,562
North Dakota	44,352	2,246	12,296	422	0	124	0	281	405
Ohio	26,243	351	0	6,147	141	246	127	5,515	6,029
Oklahoma	43,939	1,749	9,301	8,513	224	344	991	2,764	4,323
Oregon	61,558	30,103	22,323	29,810	11,633	3,494	5,522	3,562	24,211
Pennsylvania	28,728	695	.1	16,826	485	2,986	964	11,489	15,924
Rhode Island	675	6	0	404	0	32	0	363	395
South Carolina	19,330	1,194	20	12,249	573	522	2,007	9,074	12,176
South Dakota	48,609	3,152	13,397	1,702	953	153	16	346	1,467
Tennessee	26,339	2,096	400	13,161	579	687	1,121	10,433	12,820
Texas	167,691	3,528	91,599	23,279	595	201	3,771	7,946	12,513
Utah	52,527	32,167	29,701	15,557	2,277	467	0	661	3,405
Vermont	5,935	320	.2	4,512	209	213	666	3,341	4,430
Virginia	25,411	2,360	28	16,417	1,424	498	1,670	12,347	15,939
Washington	42,567	12,104	7,895	23,181	5,167	4,027	4,319	4,409	17,922
West Virginia	15,436	1,114	0	11,669	853	268	880	9,483	11,484
Wisconsin	34,833	1,897	7	14,908	1,266	3,421	1,148	8,643	14,478
Wyoming	62,073	30,610	46,896	10,028	3,045	434	54	801	4,334
Total	2,265,145	729,821	820,002	736,558	88,718	47,003	68,782	277,982	482,486

[1]Land (exclusive of water) areas from " Public Land Statistics, 1983, U.S. Department of the Interior, Bureau of Land Management, April 1983. [2]Forest and Rangeland areas from "An Analysis of the Timber Situation in the U.S., 1952-2030. Forest Resource Rpt. No. 23, USDA, Forest Service, 1982. [3]Commercial Forest land is capable of producing 20 cubic feet of wood per acre per year. [4]Abbreviations: NFS=National Forest System; Ind.=Industry; and NIPF=Non-Industrial private forest.

Major Categories. Although the information requested by the FS primarily concerned weeds, trees and herbicides used in association with forest and rangeland management, many respondents reported other areas of weed infestation and herbicide use. Because most public lands are managed for multiple uses, reports included such activities as rights-of-way and wildlife habitat management, food and forage production, aquatic weed control, Christmas tree plantations, and fuelbreak maintenance. These data were collated into four major categories, each with several subdivisions. Table 3 indicates these groupings. When respondents listed a major category only, without designating a subdivision, the category "general" was used.

Weeds. Tables 4 through 7 are lists of the most undesirable weeds by commodity and subdivision. The lists are alphabetized by common name, with scientific equivalents also given. Federal and State land managers determined that these weeds are the most undesirable and, in addition, inadequately controlled with current technology relative to their various vegetation management programs.

The relative significance of the identified undesirable weeds was calculatedin the following manner. Respondents indicated weed trends as stationary (1), up (2), or down (3). For each weed the number of responses in each of the trend categories was tallied. Then the number of 1's (stationary trend)was multiplied by 2; the number of 2's (up trend) was multiplied by 3; and the number of 3's (down trend) was multiplied by 1. The sum of these numbers for each weed indicated its relative trend.

To determine the relative undesirability of each weed, numerical values from 1 to 5 were assigned in inverse order to the priorities established by survey respondents. For example, weeds at the top of the priority list (first in undesirability) were assigned a value of 5; weeds of least priority (fifth in undesirability) were assigned a value of 1.

In tabular form:

Weed Priority		Value		Scale
1	assigned	5	=	most undesirable
2	assigned	4		
3	assigned	3		
4	assigned	2		
5	assigned	1	=	least undesirable

The sum of the values for each weed indicated its relative priority.

By adding the trend values (calculation of stationary, up, or down trends) and priority values (calculation of undesirability) for each weed, the weeds associated with Federal and State management activities can be prioritized. Tables 8 through 11 display weeds in each subdivision listed by priority according to their mathematically calculated order.

In addition, the calculations for weeds in each subdivision described above were used to determine the 10 highest ranked weeds in the four major categories. This rank, therefore, is a function of both trend and undesirability. These are listed in Table 12. The subdivisions listed in parentheses are the ones in which that weed ranked highest.

Table 3. Categories of Data Collected by the Forest Service to Determine Extent of Weeds and Herbicide Use on Federal and State Lands.

Forestry	Rangelands	NonCrop Areas	Croplands
General	General	General	General
Site Preparation	Arid	Aquatic Areas	Alfalfa/Hay
Release	Foothill	Firebreaks	Barley
Thinning	Mountain	Lawn Areas	Beans
Seed Orchards	Rainbelt	Noxious Weeds	Citrus
Christmas Trees		Ornamentals	Corn
Nurseries		Pastures	Milo
		Rights-of-Way	Oats
		Wildlife Management	Potatoes
			Rice
			Sorghum
			Soybeans
			Vegetables
			Wheat

Table 4. Weeds Associated with Forestry Activities on Public Lands that are Inadequately Controlled with Current Technology.

General Forestry

Beech
(Fagus spp.)
Berries,
(Rubus spp.)
Blackberry
(Rubus spp.)
Huckleberry
(Vaccinium sp.)
Salmonberry
(Rubus spectabilis)
Thimbleberry
(Rubus parviflorus)
Bitter cherry
(Prunus emarginata)
Black locust
(Robinia pseudoacacia)
Blackgum
(Nyssa sylvatica)
Broomsedge
(Andropogon virginicus)
Buckthorn
(Rhamnus sp.)
Buttonweed
(Diodia sp.)
Ceanothus
(Ceanothus spp.)
Chinese tallow
(Sapium sebiferum)
Coneflower
(Rudbeckia sp.)
Cottonwood
(Populus trichocarpa)
Currant
(Ribes spp.)
Dogwood
(Cornus spp.)
Elderberry
(Sambucus canadensis)
Elksedge
(Carex geyeri)
Field bindweed
(Ipomoea sp.)
Foxtail
(Alopecurus sp.)
Gallberry
(Ilex glabra)
Grapevine
(Vitis spp.)

General Forestry (Cont.)

Grasses,
(Various species)
Beargrass
(Xerophyllum tenax)
Fountaingrass
(Pennisetum ruppeli)
Quackgrass
(Agropyron repens)
Pinegrass
(Calamagrostis rubescens)
Reedgrass
(Calamagrostis canadensis)
Silvergrass
(Miscanthus sp.)
Greenbriar
(Smilax sp.)
Holly
(Ilex opaca)
Horseweed
(Conyza canadensis)
Hawthorn
(Crataegus sp.)
Hickory
(Carya sp.)
Hophornbeam
(Ostrya virginiana)
Japanese honeysuckle
(Lonicera japonica)
Koster's curse
(Clioemia hirta)
Kudzu
(Pueraria lobata)
Leafy spurge
(Euphorbia esula)
Manzanita
(Arctostaphylos manzanita)
Maple,
(Acer spp.)
Bigleaf
(A. macrophyllum)
Red
(A. rubrum)
Sugar
(A. saccharum)
Vine
(A. circinatum)
Marijuana
(Cannabis sativa)

Table 4 (Cont.)

General Forestry (Cont.)

Multiflora rose
(Rosa multiflora)
Myrtle or sweet bay
(Myrtus sp.)
Nettle
(Urtica dioica)
Passion flower
(Passiflora sp.)
Pennisetum
(Pennisetum sp.)
Peppervine
(Ampelopsis arborea)
Persimmon
(Diospyros virginiana)
Purple loosestrife
(Lysimacha sp.)
Ragweed
(Ambrosia sp.)
Rhododendron
(Rhododendron sp.)
Saw palmetto
(Scerenoa repens)
Sedges
(Carex spp.)
Sierra chinquapin
(Castanea spp.)
Shattercane
(Sorghum bicolor)
Sweet clover
(Trifolium sp.)
Sweet fern
(Comptonia peregrina)
Tamarisk
(Tamarix sp.)
Tanoak
(Lithocarpus densiflorus)
Tansy ragwort
(Tanacetum vulgare)
Teasel
(Dipsacus sp.)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Russian
(Salsola iberica)
Scotch
(Onopordum acanthium)
Toadflax,
(Linaria spp.)
Dalmation
(L. dalmatica)
Yellow
(L. vulgaris)

General Forestry (Cont.)

Verbena
(Verbena sp.)
Vetch
(Vicia sp.)
Wax myrtle
(Myrica sp.)
Wild buckwheat
(Fagopyrum sp.)
Yellow starthistle
(Centaurea solstitialis)

Site Preparation

Alder,
(Alnus spp.)
Red
(A. rubra)
Sitka
(A. sinuata)
Aspen
(Populus tremuloides)
Bearclover
(Chamabaetia foliolosa)
Berries,
(Rubus spp.)
Huckleberry
(Vaccinium sp.)
Raspberry
(Rubus idaeus)
Salmonberry
(Rubus spectabilis)
Broomsedge
(Andropogon sp.)
Camphor vine
(Heterotheca sp.)
Devil's club
(Oplopanax velutinus)
Ferns,
(Various species)
Hayscented
(Dennstaedtia punctilobula)
New York
(Dryopteris noveboracensis)
Grapevine
(Vitis sp.)
Grasses,
(Various species)
Beargrass
(Xerophyllum tenax)
Bermudagrass
(Cynodon dactylon)
Pinegrass
(Calamagrostis rubescens)

Table 4 (Cont.)

Site Preparation (Cont.)

Kudzu
(Pueraria lobata)
Little Bluestem
(Andropogon sp.)
Madrone
(Arbutus sp.)
Manzanita
(Arctostaphylos manzanita)
Maple,
(Acer spp.)
Bigleaf
(A. macrophyllum)
Red
(A. rubrum)
Striped
(A. pennsylvanicum)
Vine
(A. circinatum)
Mountain laurel
(Kalmia latifolia)
Ninebark
(Physocarpus sp.)
Oak
(Quercus spp.)
Sedges
(Carex spp.)
Snowbrush ceanothus
(Ceanothus velutinus)
Tanoak
(Lithocarpus sp.)

Release

Bearclover
(Chamabaetia foliolosa)
Berries,
(Rubus spp.)
Blackberry
(Rubus sp.)
Raspberry
(R. idaeus)
Salmonberry
(R. spectabilis)
Black locust
(Robinia pseudoacacia)
Blackgum
(Nyssa sylvatica)
Bracken fern
(Pteridium sp.)

Release (Cont.)

Conifers
(Various species)
Douglas-fir
(Pseudotsuga menziesii)
Grand fir
(Abies grandis)
Lodgepole pine
(Pinus contorta)
Western hemlock
(Tsuga sp.)
Cottonwood
(Populus trichocarpa)
Grasses
(e.g. Calamagrostis rubescens)
Hickory
(Carya sp.)
Madrone
(Arbutus sp.)
Manzanita
(Arctostaphylos manzanita)
Maple,
(Acer spp.)
Bigleaf
(A. macrophyllum)
Red
(A. rubrum)
Vine
(A. circinatum)
Oak
(Quercus spp.)
Red alder
(Alnus rubra)
Sedges
(Carex spp.)
Snowbrush ceanothus
(Ceanothus velutinus)
Sweetgum
(Liquadambar styraciflua)
Tanoak
(Lithocarpus sp.)

Thinning

Alder,
(Alnus spp.)
Red
(A. rubra)
Sitka
(A. sinuata)
Bigleaf maple
(Acer macrophyllum)
Ceanothus
(Ceanothus spp.)

Table 4 (Cont.)

Thinning (Cont.)

Conifers,
(Various species)
Douglas-fir
(Pseudotsuga menziesii)
Lodgepole pine
(Pinus contorta)
Sitka spruce
(Picea sitchensis)
Western hemlock
(Tsuga sp.)
Cottonwood
(Populus trichocarpa)
Junipers
(Juniperus sp.)
Madrone
(Arbutus sp.)
Oaks
(Quercus sp.)
Tanoak
(Lithocarpus sp.)
Willow
(Salix spp.)

Seed Orchards

Autumn olive
(Eleagnus umbellata)
Bracken fern
(Pteridium sp.)
Canadian thistle
(Cirsium arvense)
Grasses
(Various species)
Mimosa
(Mimosa sp.)
Snowberry
(Symphoricarpus sp.)
Spotted knapweed
(Centaurea maculosa)
White clover
(Trifolium sp.)

Christmas Tree Plantations

Blackgum
(Nyssa sylvatica)
Canadian thistle
(Cirsium arvense)
Dogbane
(Apocynum sp.)
Leafy spurge
(Euphorbia esula)
Orchard grass
(Dactylis glomerata)

Christmas Tree Plantations (Cont.)

Redroot pigweed
(Amaranthus sp.)
Rye
(Lolium perenne)
Vetch
(Vicia sp.)

Nurseries

Canadian thistle
(Cirsium arvense)
Carpetweed
(Mollugo verticillata)
Chickweed
(Stellaria media)
Dandelion
(Taraxacum officinale)
Field bindweed
(Ipomoea sp.)
Foxtail
(Setaria sp.)
Grasses,
(Various species)
Annual
(Various species)
Barnyardgrass
(Echinochloa crus-galli)
Bromegrass
(Bromus sp.)
Centipedegrass
(Eremochloa ophiuroides)
Cheatgrass
(Bromus secalinus)
Crabgrass,
(Digitaria spp.)
Giant
(D. longifolia)
Slender
(D. filiformis)
Groundsel
(Senecio vulgaris)
Henbit
(Lamium amplexicaule)
Lambsquarters
(Chenopodium album)
Mallow,
(Malva spp.)
Common
(M. neglecta)
Little
(M. parviflora)
Roundleaf
(Malva sp.)

Table 4 (Cont.)

Nurseries (Cont.)

Mustard
(Brassica sp.)
Nutsedge,
(Cyperus spp.)
Purple
(C. rotundus)
Yellow
(C. esculentus)
Pigweed,
(Amaranthus spp.)
Prostrate
(A. blitoides)
Redroot
(A. retroflexus)
Poverty weed
(Monoleopis nuttalliana)
Puncturevine
(Tribulus terrestris)
Purslane
(Portulaca oleracea)
Pusley
(Richardia sp.)
Redstem filaree
(Erodium cicutarium)
Sandbur
(Cenchrus sp.)
Sandspurry
(Spergula sativa)
Sheep's sorrel
(Rumex sp.)
Sheperd's purse
(Capsella bursa-pastoris)
Spurge,
(Euphorbia spp.)
Leafy
(E. esula)
Prostrate
(E. humistrata)
Spotted
(E. maculata)
Wild Geranium
(Geranium sp.)
White clover
(Trifolium sp.)
Whitehorse nettle
(Urtica sp.)

Table 5. Weeds Associated with Rangeland Management that are Inadequately Controlled with Current Technology.

General

Deerbrush ceanothus
(Ceanothus integerrimus)
Dyers woad
(Isatis tinctoria)
Field bindweed
(Ipomoea sp.)
Goatweed
(Hypericum perforatum)
Grasses,
(Various species)
Beargrass
(Xerophyllum tenax)
Cheatgrass
(Bromus secalinus)
Johnsongrass
(Sorghum halepense)
Peppergrass
(Lepidium sp.)
Quackgrass
(Agropyron repens)
Halogeton
(Halogeton glomeratus)
Hounds tongue
(Cynoglossum officinale)
Juniper,
(Juniperus spp.)
Alligator
(J. pachyphloea)
Utah
(J. utahensis)
Knapweed,
(Centaurea spp.)
Diffuse
(C. diffusa)
Russian
(C. repens)
Spotted
(C. maculosa)
Leafy spurge
(Euphorbia esula)
Medusahead
(Elymus caput-medusae)
Orange sneezeweed
(Helenium hoopesii)
Pigweed
(Amaranthus sp.)
Purple loosestrife
(Lysimachia sp.)

General (Cont.)

Rhododendron
(Rhododendron sp.)
Rubber rabbitbrush
(Chrysothamnus nauseosus)
Russian olive
(Eleagnus angustifolia)
Sagebrush
(Artemisia sp.)
Salal
(Gaultheria shallon)
Saltcedar
(Tamarix ramosissma)
Scrub oak
(Quercus sp.)
Siberian elm
(Ulmus pumila)
Tamarisk
(Tamarix sp.)
Tanoak
(Lithocarpus sp.)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Musk
(Carduus nutans)
Musk nodding
(Carduus sp.)
Plumeless
(Carduus acanthoides)
Scotch
(Onopordum acanthium)
Toadflax,
(Linaria spp.)
Dalmation
(L. dalmatica)
Yellow
(L. vulgaris)
Whitetop
(Cardaria sp.)
Wormwood sage
(Artemisia sp.)
Wyethia
(Wyethia sp.)

Arid

Camelthorn
(Alhagi pseudalhagi)

Table 5 (Cont.)

Arid (Cont.)

Dalmatian toadflax
(Linaria dalmatica)
Field bindweed
(Ipomoea sp.)
Mediterranean sage
(Salvia aethiopsis)
Mesquite
(Prosopis sp.)
Russian knapweed
(Centaurea repens)
Saltcedar
(Tamarix ramosissima)
Tarweed
(Madia sp.)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Yellow star-
(Centaurea solstitialis)
Turbinella oak
(Quercus turbinella)
Utah juniper
(Juniperus utahensis)

Foothill

Dyers woad
(Isatis tinctoris)
Knapweeds
(Centaurea spp.)
Leafy spurge
(Euphorbia esula)
Medusahead
(Elymus caput-medusae)
Mediterranean sage
(Salvia aethiopsis)
Scotch broom
(Cytissus scoparius)
Skeletonweed
(Lygodesmia juncea)
Tansy ragwort
(Tanacetum vulgare)
Yellow starthistle
(Centaurea solstitialis)

Mountain

Klamath weed
(Hypericum perforatum)
Knapweeds
(Centaurea spp.)
Leafy spurge
(Euphorbia esula)
Marlahan mustard
(Brassica sp.)
Tansy ragwort
(Tanacetum vulgare)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Yellow star-
(Centaurea solstitialis)
Whitetop
(Cardaria sp.)
Willow
(Salix spp.)

Rainbelt

None reported

Table 6. Noncrop Weeds Associated with Federal Lands that are Inadequately Controlled with Current Technology.

General

Beefwood or Australian Pine
(Casuarina sp.)
Berries
(Rubus spp.)
Black locust
(Robinia pseudoacacia)
Broadleaf plantain
(Plantago major)
Cattails
(Typha spp.)
Chickweed
(Stellaria sp.)
Curly dock
(Rumex crispus)
Dalmation toadflax
(Linaria dalmatica)
Dandelion
(Taraxacum officinale)
Elephant grass
(Pennisetum purpureum)
Field bindweed
(Ipomoea sp.)
Firetree
(Nuytsia floribunda)
Foxtail
(Setaria sp.)
Giant cane
(Arundinaria gigantea)
Gorse
(Ulex europaeus)
Grasses,
(Various species)
Annual
(Various species)
Bermudagrass
(Cynodon dactylon)
Crabgrass
(Digitaria spp.)
Dallasgrass
(Paspalum dilatatum)
Guineagrass
(Panicum maximum)
Johnsongrass
(Sorghum halepense)
Kentucky fescue
(Festuca sp.)
Kikuyugrass
(Pennisetum clandestinum)
Quackgrass
(Agropyron repens)

General (Cont.)

Honeysuckle
(Lonicera sp.)
Jimsonweed
(Datura stramonium)
Juniper
(Juniperus sp.)
Kahili ginger
(Zingiber sp.)
Knapweed,
(Centaurea spp.)
Diffuse
(C. diffusa)
Russian
(C. repens)
Spotted
(C. maculosa)
Koa-haole
(Leaucana glauca)
Kudzu
(Pueraria lobata)
Lambsquarters
(Chenopodium album)
Leafy spurge
(Euphorbia esula)
Melaleuca
(Melaleuca sp.)
Mugwort
(Artemisia vulgaris)
Peppertree
(Schinus sp.)
Persimmon
(Diospyros sp.)
Pigweed
(Amaranthus sp.)
Poison ivy
(Rhus radicans)
Poplar
(Populus trichocarpa)
Prickly sida
(Sida spinosa)
Ragweed
(Ambrosia sp.)
Reeds
(Phragmites spp.)
Rush skeletonweed
(Chondrilla juncea)
Sandbur
(Cenchrus sp.)

Table 6 (Cont.)

General (Cont.)

Sassafras
(Sassafras albidum)
Scotch broom
(Cytissus scoparius)
Tamarisk
(Tamarix sp.)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Russian
(Salsola iberica)
Yellow star-
(Centaurea solstitialis)
Wild millet
(Panicum sp.)
Wild onion
(Allium canadense)
Willow
(Salix sp.)
Yellow nutsedge
(Cyperus esculentus)
Yerba santa
(Anemopsis sp.)

Aquatic Areas

Algae
(Spirogyra & Cladophora spp.)
Arrowweed
(Peltandra virginica)
Cattails
(Typha sp.)
Giant cutgrass
(Leersia sp.)
Grasses
(Various species)
Hardstem bulrush
(Scirpus sp.)
Hydrilla
(Hydrilla verticillata)
Jointgrass
(Equisetum sp.)
Naiad,
(Najas spp.)
Southern
(N. guadalupensis)
Spinyleaf
(Najas sp.)
Poison hemlock
(Cicuta sp.)
Purple loosestrife
(Lysimachia sp.)

Aquatic Areas (Cont.)

Reeds
(Phragmites sp.)
Reed canarygrass
(Phalaris arundinacea)
Saltcedar
(Tamarix sp.)
Sourwood
(Oxydendrum sp.)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Scotch
(Onopordum acanthium)
Waterchestnut
(Trapa natans)
Watermilfoil
(Myriophyllum spicatum)

Firebreak Maintenance Areas

Chamise
(Adenstoma sp.)
Scrub live oak
(Quercus virginiana)

Lawns

Nutsedge
(Cyperus sp.)

Noxious Weeds

Dyers woad
(Isatis tinctoria)
Johnsongrass
(Sorghum halepense)
Knapweed,
(Centaurea spp.)
Diffuse
(C. diffusa)
Russian
(C. repens)
Spotted
(C. maculosa)
Leafy spurge
(Euphorbia esula)
Multifora rose
(Rosa multiflora)

Table 6 (Cont.)

Noxious Weeds (Cont.)

Poison oak
(Rhus toxicodendron)
Scotch broom
(Cytissus scorparius)
Skeletonweed
(Lygodesmia juncea)
St. Johnswort (Klamath weed)
(Hypericum perforatum)
Tansy ragwort
(Senecia jacobaea)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Musk
(Carduus nutans)
Yellow star-
(Centaurea solstitialis)
Toadflax,
(Linaria spp.)
Dalmation
(L. dalmatica)
Yellow
(L. vulgaris)

Ornamentals

Henbit
(Lamium amplexicaule)
Chickweed
(Stellaria sp.)
Virginia creeper
(Parthenocissus quinquefolia)
Field bindweed
(Ipomoea sp.)

Pasture

Canadian thistle
(Cirsium arvense)
Goldenrod
(Solidago sp.)
Himalaya blackberry
(Rubus sp.)
Johnsongrass
(Sorghum halepense)
Multiflora rose
(Rosa multiflora)
Soft rush
(Juncus effusus)

Wildlife Habitat Management Areas

Black locust
(Robinia pseudacacia)
Coontail
(Ceratophyllum demersum)
Kochia
(Kochia scoparia)
Leafy spurge
(Euphorbia esula)
Purple loosestrife
(Lysimachia sp.)
Thistles
(Various species)
Watermilfoil
(Myriophyllum sp.)

Rights-of-Way

Alder,
(Alnus spp.)
Red
(A. rubra)
Sitka
(A. sitchensis)
Bigleaf maple
(Acer macrophyllum)
Blackberry
(Rubus sp.)
Douglas-fir
(Pseudotsuga menziesii)
Horsetail
(Equisetum sp.)
Knapweed,
(Centaurea spp.)
Diffuse
(C. diffusa)
Russian
(C. repens)
Spotted
(C. maculosa)
Kochia
(Kochia scoparia)
Ninebark
(Physocarpus sp.)
Nutsedge
(Cyperus sp.)
Pepperweed
(Lepidium sp.)
Rush skeletonweed
(Chondrilla juncea)
Salal
(Gaultheria shallon)
Saltcedar
(Tamarix sp.)
Tansy ragwort
(Senecio jacobaea)

Table 6 (Cont.)

Rights-of-Way (Cont.)

Thistle,
(Various species)
Canadian
(Cirsium arvense)
Russian
(Salsola iberica)
Yellow star-
(Centaurea solstitialis)
Whitetop
(Cardaria sp.)
Willow
(Salix sp.)

Table 7. Weeds Associated with Crops on Federal Lands that are Inadequately Controlled with Current Technology.

General

- Cocklebur (Xanthium sp.)
- Field bindweed (Ipomoea sp.)
- Foxtail (Setaria sp.)
- Grasses, (Various species)
  - Annual (Various species)
  - Bromegrass (Bromus sp.)
  - Fescue (Festuca sp.)
  - Johnsongrass (Sorghum halepense)
  - Mannagrass (Glyceria septentrionalis)
  - Pigeongrass (Setaria sp.)
- Hemp sesbania (Sesbania exalta)
- Jimsonweed (Datura stramonium)
- Knapweed (Centaurea spp.)
- Kochia (Kochia sp.)
- Lambsquarters (Chenopodium sp.)
- Pigweed (Amaranthus sp.)
- Sandbur (Cenchrus sp.)
- Sicklepod (Cassia obtusifolia)
- Sunflower (Helianthus sp.)
- Velvetleaf (Abutilon theophrasti)
- Vetch (Vicia sp.)
- Wild garlic (Allium vineale)
- Wild mustard (Sinapis arvensis)
- Wild oats (Avena fatua)
- Wild onion (Allium canadense)
- Yellow nutsedge (Cyperus esculentus)

Alfalfa and Hay

- Bluegrass (Poa sp.)
- Canadian thistle (Cirsium arvense)
- Field bindweed (Ipomoea sp.)
- Forbs (Various species)
- Kochia (Kochia sp.)
- Ryegrass (Lolium sp.)
- Sunflower (Helianthus sp.)
- Tansy ragwort (Senecio jacobaea)
- Volunteer corn (Zea mays)
- Watergrass (Echinochloa oryzoides)
- Wild mustard (Sinapis arvensis)

Barley

- Field bindweed (Ipomoea sp.)
- Foxtail barley (Hordeum jubatum)
- Grasses, (Various species)
  - Quackgrass (Agropyron repens)
  - Pigeongrass (Setaria sp.)
- Kochia (Kochia sp.)
- Lambsquarters (Chenopodium sp.)
- Spotted knapweed (Centaurea maculosa)
- Sunflower (Helianthus sp.)
- Thistle, (Various species)
  - Canadian (Cirsium arvense)
  - Sow- (Sonchus sp.)
- Tumble mustard (Sisymbrium altissimum)
- Whitetop (Cardaria sp.)

Table 7 (Cont.)

Barley (Cont.)

Wild oats
(Avena fatua)

Beans

Canadian thistle
(Cirsium arvense)
Field bindweed
(Ipomoea sp.)
Forbs
(Various species)
Volunteer corn
(Zea mays)

Citrus

Paragrass
(Brachiara mutica)
Peppertree
(Schinus sp.)

Corn

Common cocklebur
(Xanthium sp.)
Fall panicum
(Panicum dichotomiflorum)
Field bindweed
(Ipomoea sp.)
Foxtail,
(Setaria spp.)
Giant
(S. faberia)
Green
(S. viridis)
Yellow
(S. glauca)
Foxtail barley
(Hordeum jubatum)
Grasses,
(Various species)
Crabgrass
(Digitaria sp.)
Johnsongrass
(Sorghum halepense)
Pigeongrass
(Setaria sp.)
Quackgrass
(Agropyron repens)

Corn (Cont.)

Jimsonweed
(Datura stramonium)
Kochia
(Kochia sp.)
Lambsquarters
(Chenopodium sp.)
Millet,
(Panicum spp.)
Barnyard
(Panicum sp.)
Proso
(P. miliaceum)
Pigweed
(Amaranthus sp.)
Ragweed
(Ambrosia sp.)
Shattercane
(Sorghum biclor)
Sunflower
(Helianthus sp.)
Swamp smartweed
(Polygonum coccineum)
Thistle,
(Various species)
Canadian
(Cirsium arvense)
Sow-
(Sonchus oleraceous)
Velvetleaf
(Abutilon theophrasti)
Wild radish
(Raphanus raphanistrum)

Soybeans

Black nightshade
(Solanum nigrum)
Canadian thistle
(Cirsium arvense)
Field bindweed
(Ipomoea sp.)
Foxtail,
(Setaria spp.)
Giant
(S. faberi)
Green
(S. viridis)
Yellow
(S. glauca)

Table 7 (Cont.)

Soybeans (Cont.)

- Grasses,
  - (Various species)
  - Cheatgrass
    - (Bromus secalinus)
  - Johnsongrass
    - (Sorghum halepense)
  - Pigeongrass
    - (Setaria sp.)
  - Quackgrass
    - (Agropyron repens)
- Nutsedge
  - (Cyperus sp.)
- Pigweed
  - (Amaranthus sp.)
- Ragweed
  - (Ambrosia sp.)
- Smooth cocklebur
  - (Xanthium sp.)
- Sunflower
  - (Helianthus sp.)
- Swamp smartweed
  - (Polygonum coccineum)
- Velvetleaf
  - (Abutilon theophrasti)
- Wild mustard
  - (Sinapis arvensis)

Wheat

- Cocklebur
  - (Xanthium sp.)
- Field bindweed
  - (Ipomoea sp.)
- Foxtail,
  - (Setaria spp.)
  - Green
    - (S. viridis)
  - Yellow
    - (S. glauca)
- Goatweed
  - (Hypericum perforatum)
- Grasses,
  - (Various species)
  - Bluegrass
    - (Poa sp.)
  - Cheatgrass
    - (Bromus secalinus)
  - Peppergrass
    - (Lepidium sp.)
  - Pigeongrass
    - (Setaria sp.)
  - Ryegrass
    - (Lolium sp.)

Wheat (Cont.)

- Kochia
  - (Kochia sp.)
- Lambsquarters
  - (Chenopodium sp.)
- Puncturevine
  - (Tribulus terrestris)
- Ragweed
  - (Ambrosia sp.)
- Sandbur
  - (Cenchrus sp.)
- Spotted knapweed
  - (Centaurea maculosa)
- Thistle,
  - (Various species)
  - Canadian
    - (Cirsium arvense)
  - Plumeless
    - (Carduus acanthoides)
  - Sow-
    - (Sonchus sp.)
- Velvetleaf
  - (Abutilon theophrasti)
- Wild oats
  - (Avena fatua)
- Wild onion
  - (Allium canadense)
- Wild mustard
  - (Sinapis arvensis)

Milo

- Common cocklebur
  - (Xanthium sp.)
- Grasses,
  - (Various species)
  - Cheatgrass
    - (Bromus secalinus)
  - Pigeongrass
    - (Setaria sp.)
- Kochia
  - (Kochia sp.)
- Pigweed
  - (Amaranthus sp.)
- Ragweed
  - (Ambrosia sp.)
- Russian thistle
  - (Salsola iberica)

Oats

- Foxtail
  - (Setaria sp.)
- Kochia
  - (Kochia sp.)

Table 7 (Cont.)

Oats (Cont.)

Lambsquarters
(Chenopodium sp.)
Pigeongrass
(Setaria sp.)
Sowthistle
(Sonchus oleraceus)

Potatoes

Quackgrass
(Agropyron repens)
Volunteer corn
(Zea mays)

Rice

Alligatorweed
(Alternanthera philoxeroides)
Barnyard grass
(Echinochloa crus-galli)
Dayflower
(Commelina sp.)
Spikerush
(Eleocharis sp.)
Texas millet
(Panicum texanum)
Watergrass
(Hydrochloa sp.)

Sorghum

Cocklebur
(Xanthium sp.)
Fall panicum
(Panicum dichotomiflorum)
Foxtail
(Setaria sp.)
Jimsonweed
(Datura stramonium)
Johnsongrass
(Sorghum halepense)
Nightshade
(Solanum sp.)
Sunflower
(Helianthus sp.)
Velvetleaf
(Abutilon theophrasti)

Table 8. Prioritized List of Weeds Associated with Forestry Activities on Federal and State Lands that are Inadequately Controlled with Current Technology.

General

Kudzu
Leafy spurge
Canadian thistle
Japanese honeysuckle
Thimbleberry
Red maple
Salmonberry
Blackberry
Sweetgum
Purple loosestrife
Russian thistle
Sweet clover
Ceanothus
Bigleaf maple
Grasses
Broomsedge
Gallberry
Grapevine
Hickory
Tanoak
Field bindweed
Sugar maple
Reedgrass
Manzanita
Oak
Passion flower
Wax myrtle
Bitter cherry
Foxtail
Pinegrass
Greenbriar
Horseweed
Koster's curse
Myrtle (sweet bay)
Rhododendron
Sierra chinquapin
Yellow starthistle
Sweet fern
Black locust
Multiflora rose
Huckleberry
Buckthorn
Elksedge
Silvergrass
Hophornbeam
Marijuana
Giant ragweed
Shattercane
Teasel
Blackgum
Beargrass
Quackgrass
Vine maple

General (Cont.)

Stinging nettle
Pennisetum
Peppervine
Saw palmetto
Wild buckwheat
Coneflower
Chinese tallow
Tamarisk
Currant
Fountaingrass
Hawthorn
Persimmon
Sedges
Tansy ragwort
Thistles
Verbena
Vetch
Scotch thistle
Dalmation toadflax
Beech
Buttonweed
Cottonwood
Dogwood
Elderberry
American holly
Yellow toadflax

Site Preparation

Grasses
Snowbrush ceanothus
Red alder
Pinegrass
Vine maple
Manzanita
Madrone
Tanoak
Beargrass
Ninebark
Huckleberry
Hayscented fern
New York fern
Grapevine
Kudzu
Bigleaf maple
Aspen
Salmonberry
Camphor vine
Striped maple
Mountain laurel
Sedges
Broomsedge
Sitka alder

Site Preparation (Cont.)

Raspberry
Little bluestem
Bermuda grass
Bearclover
Devil's club
Oak

Release

Red alder
Vine maple
Snowbrush ceanothus
Red maple
Grasses
Madrone
Tanoak
Douglas-fir
Manzanita
Bracken fern
Bigleaf maple
Lodgepole pine
Western hemlock
Cottonwood
Oak
Salmonberry
Grand fir
Black locust
Bearclover
Raspberry
Sedges
Blackberry
Hickory
Blackgum
Sweetgum

Thinning

Madrone
Tanoak
Red alder
Douglas-fir
Lodgepole pine
Cottonwood
Bigleaf maple
Alder
Ceanothus
Western hemlock
Oak
Sitka alder
Willow
Juniper
Sitka spruce
Conifers

Table 8 (Cont.)

Seed Orchards

Annual grasses
White clover
Mimosa
Autumn olive
Bracken fern
Spotted knapweed
Canadian thistle
Snowberry

Christmas Tree Plantations

Canadian thistle
Leafy spurge
Blackgum
Vetch
Dogbane
Redroot pigweed
Perennial rye
Orchard grass

Nurseries

Common purslane
Yellow nutsedge
Redroot pigweed
Redstem filaree
Sand spurry
Field bindweed
Annual grasses
Prostrate spurge
Common groundsel
White clover
Wild geranium
Henbit
Prostrate pigweed
Barnyard grass
Shepherds purse

Nurseries (Cont.)

Leafy spurge
Spotted spurge
Lambsquarters
Common mallow
Purple nutsedge
Poverty weed
Sandbur
Bromegrass
Nutsedges
Sheep's sorrel
Whitehorse nettle
Carpetweed
Chickweed
Foxtail
Grasses
Pusley
Canadian thistle
Cheatgrass
Crabgrass
Giant crabgrass
Little mallow
Roundleaf mallow
Annual mustard
Puncturevine
Dandelion

Table 9. Prioritized List of Weeds Associated with Rangeland Management that are Inadequately Controlled with Current Technology.

General	Arid	Foothill	Mountain	Rainbelt
Leafy spurge	Russian knapweed	Knapweeds	Canadian thistle	None reported
Canadian thistle	Yellow starthistle	Leafy spurge	Knapweeds	
Spotted knapweed	Camelthorn	Tansy ragwort	Tansy ragwort	
Musk thistle	Mediterranean sage	Skeletonweed	Leafy spurge	
Russian knapweed	Mesquite	Mediterranean sage	Yellow starthistle	
Scotch thistle	Tarweed	Yellow starthistle	Klamathweed	
Diffuse knapweed	Turbinella oak	Dyers woad	Marlahan mustard	
Yellow toadflax	Dalmation toadflax	Medusahead	Whitetop	
Sagebrush	Canadian thistle	Scotch broom	Willow	
Thistles	Utah juniper			
Whitetop	Field bindweed			
Deerbrush ceanothus	Saltcedar			
Peppergrass				
Utah juniper				
Medusahead				
Musk nodding thistle				
Hounds tongue				
Saltcedar				
Tamarisk				
Goatweed				
Johnsongrass				
Halogeton				
Alligator juniper				
Pacific rhododendron				
Field bindweed				
Grasses				
Cheatgrass				
Quackgrass				
Orange sneezeweed				
Pigweed				
Purple loosestrife				
Russian olive				
Tanoak				
Dyers woad				
Salal				
Scrub oak				
Siberian elm				
Dalmation toadflax				
Wormwood sage				
Wyethia				
Beargrass				
Plumeless thistle				

Table 10. Prioritized List of Weeds Associated with Noncropland Management that are Inadequately Controlled with Current Technology.

General

Sassafras
Persimmon
Canadian thistle
Kudzu
Johnsongrass
Crabgrass
Poison ivy
Thistle
Chickweed
Honeysuckle
Leafy spurge
Foxtail
Bermuda grass
Dandelion
Nutsedge
Juniper
Knapweed
Dallasgrass
Lambsquarters
Russian knapweed
Kikuyu grass
Mugwort
Peppertree
Tamarisk
Yellow starthistle
Wild onion
Beefwood (Australian pine)
Curly dock
Gorse
Annual grasses
Cheatgrass
Diffuse knapweed
Koa-haole
Spotted knapweed
Multiflora rose
Prickly sida
Russian thistle
Wild millet
Willow
Yerba santa
Field bindweed
Fire tree
Kahili ginger
Guineagrass
Kentucky fescue
Quackgrass
Jimsonweed
Broadleaf plantain
Ragweed
Rush skeletonweed
Sandbur
Black locust
Cattail
Melaleuca

General (Cont.)

Poplar
Berries
Elephantgrass
Dalmation toadflax
Pigweed
Scotch broom
Giant Cane

Aquatic Areas

Purple loosestrife
Cattails
Hydrilla
Saltcedar
Eurasian watermilfoil
Californiagrass
Poison hemlock
Reed canarygrass
Scotch thistle
Southern naiad
Arrowweed
Giant cutgrass
Reeds
Sourbush
Spinyleaf naiad
Waterchestnut
Filamentous algae
Hardstem bulrush
Canadian thistle
Jointgrass

Firebreaks

Chamise
Scrub live oak

Lawns

Nutsedge

Noxious Weeds

Leafy spurge
Canadian thistle
Spotted knapweed
Yellow starthistle
Johnsongrass
St. Johnswort
Tansy ragwort
Skeletonweed
Russian knapweed
Multiflora rose
Poison oak
Dyers woad

Noxious Weeds (Cont)

Dalmation toadflax
Scotch broom
Yellow toadflax
Diffuse knapweed
Musk thistle

Ornamentals

Henbit
Chickweed
Virginia creeper
Field bindweed

Rights-of-Way

Canadian thistle
Spotted knapweed
Sitka alder
Blackberry
Douglas-fir
Horsetail
Red alder
Ninebark
Whitetop
Diffuse knapweed
Russian knapweed
Yellow starthistle
Nutsedge
Kochia
Willow
Bigleaf maple
Russian thistle
Pepperweed
Salal
Saltcedar
Rush skeletonweed
Tansy ragwort

Wildlife Management Areas

Kochia
Leafy spurge
Watermilfoil
Black locust
Coontail
Purple loosestrife
Thistles

Table 11. Prioritized List of Weeds Associated with Cropland Management on Public Lands which are Inadequately Controlled with Current Technology.

General

Johnsongrass
Cocklebur
Field bindweed
Sicklepod
Foxtail
Pigeongrass
Kochia
Pigweed
Sunflower
Wild mustard
Wild garlic
Wild oats
Annual grasses
Fescue
Velvetleaf
Whitetop
Yellow nutsedge
Bromegrass
Mannagrass
Knapweed
Vetch
Wild onion
Hemp sesbania
Jimsonweed
Lambsquarters
Sandbur

Alfalfa/Hay

Watergrass
Volunteer corn
Forbs
Ryegrass
Tansy ragwort
Canadian thistle
Bluegrass
Field bindweed
Wild mustard
Kochia

Barley

Kochia
Wild oats
Canadian thistle
Spotted knapweed
Field bindweed
Pigeongrass
Lambsquarters
Sunflower
Whitetop
Sowthistle
Tumble mustard
Foxtail barley
Quackgrass

Beans

Volunteer corn
Canadian thistle
Field bindweed
Forbs

Citrus

Peppertree
Paragrass

Corn

Johnsongrass
Cocklebur
Foxtail
Swamp smartweed
Pigeongrass
Green foxtail
Velvetleaf
Yellow foxtail
Foxtail barley
Kochia
Jimsonweed
Proso millet
Ragweed
Wild radish
Pigweed
Quackgrass
Barnyard millet
Shattercane
Fall panicum
Field bindweed
Giant foxtail
Sunflower
Canadian thistle
Sowthistle
Crabgrass
Lambsquarters

Milo

Cocklebur
Cheatgrass
Pigeongrass
Kochia
Ragweed
Russian thistle
Pigweed

Oats

Foxtail
Kochia
Lambsquarters
Sowthistle
Pigeongrass

Potatoes

Quackgrass
Volunteer corn

Rice

Watergrass
Alligatorweed
Barnyardgrass
Texas millet
Dayflower
Spikerush

Sorghum

Sunflower
Johnsongrass
Velvetleaf
Foxtail
Cocklebur
Fall panicum
Nightshade
Jimsonweed

Soybeans

Cocklebur
Velvetleaf
Johnsongrass
Foxtail
Pigweed
Green foxtail
Swamp smartweed
Yellow foxtail
Ragweed
Cheatgrass
Quackgrass
Black nightshade
Pigeongrass
Sunflower
Wild mustard
Nutsedge
Canadian thistle
Field bindweed
Giant foxtail

Wheat

Cheatgrass
Field bindweed
Canadian thistle
Wild mustard
Kochia

Table 11 (Cont.)

Wheat (Cont.)

Wild oats
Foxtail
Pigeongrass
Cocklebur
Green foxtail
Peppergrass
Ryegrass
Sandbur
Wild onion
Yellow foxtail
Bluegrass
Spotted knapweed
Puncturevine
Ragweed
Sowthistle
Goatweed
Lambsquarters
Velvetleaf
Plumeless thistle

Table 12. Ten Highest Ranked Undesirable Weeds[1] in Each of the Four Major Public Land Management Categories.

Category	Weed and Subdivision [2]	Category	Weed and Subdivision [2]
Forestry	Grasses (Site Preparation/Release)	Noncrop Areas	Sassafras (General)
	Ceanothus (Site Preparation)		Persimmon (General)
	Purslane (Nurseries)		Canadian thistle (General)
	Field bindweed (Nurseries)		Kudzu (General)
	Red alder (Site Preparation/Release)		Johnsongrass (General)
	Yellow nutsedge (Nurseries)		Leafy spurge (Noxious Weeds)
	Kudzu (General forestry)		Crabgrass (General)
	Redroot pigweed (Nurseries)		Purple loosestrife (Aquatic areas)
	Leafy Spurge (General forestry)		Poison ivy (General)
	Canadian thistle (General forestry)		Thistles (General)
Range	Leafy spurge (General, Foothill, Mountain)	Croplands	Johnsongrass (General, Corn, Soybeans)
	Canadian thistle (General, Mountain)		Cocklebur (General, Soybeans, Corn)
	Spotted knapweed (General)		Field bindweed (General, Wheat)
	Musk thistle (General)		Cheatgrass (Wheat)
	Russian knapweed (General, Arid)		Foxtail (Corn)
	Rubber rabbitbrush (General)		Velvetleaf (Soybeans)
	Knapweeds (Foothill, Mountain)		Canadian thistle (Wheat)
	Scotch thistle (General)		Kochia (Barley, Wheat)
	Tansy ragwort (Foothill, Mountain)		Wild oats (Barley)
	Yellow starthistle (Arid, Foothill, Mountain)		Sicklepod (General)

[1]Highest ranked weeds in order of priority were determined by those ranking highest in combined trend and priority when all subdivisions within the category were considered.
[2]The subdivision(s) in which the named weed ranked highest are indicated in parentheses.

Herbicides. Analyses of herbicides used for weed control have been conducted in a fashion similar to those performed on the weeds themselves. The data used for the calculations were collected on the same survey forms (Figure 1) as those that provided the data on weeds, and have the same limitations previously noted.

Tables 13 through 16 are alphabetical lists of herbicides used for weed control in forestry, in range management, in non-crop management, and in cropland management. All of the herbicides are listed by common name of their active ingredients as listed in "Farm Chemicals Handbook '85," and the "Herbicide Handbook" of the Weed Science Society of America - 1983.

Respondents indicated expected trends in herbicide usage as stationary (1), up (2), or down (3). Note that these are judgements of anticipated usage: indicating (1) no change from present usage, (2) increased usage, or (3) decreased usage. For each herbicide the number of responses in each of the trend categories was tallied. Then the number of 1's was multiplied by 2, the number of 2's was multiplied by 3, and the number of 3's was multiplied by 1. The sum of these numbers for each herbicide indicated its relative usage trend.

To determine the relative importance of each herbicide, they were prioritized according to the amount of acreage on which they are currently used. The herbicide used on the greatest number of acres received a 5; the one used on the least number of acres, a 1. Numerical values from 5 to 1 were assigned in that manner.

The sum of the values for each herbicide indicates its relative priority.

By adding the usage trend values and priority values for each herbicide, the herbicides used for weed control in Federal and State management activities can be prioritized. Tables 17 through 20 display herbicides in each subdivision listed by priority according to their mathematically calculated order.

In addition, the calculations for herbicides in each subdivision described above were used to determine the 10 highest ranked herbicides in the four major categories. This rank, therefore, is a function of both projected usage trends and importance relative to current usage. These are listed in Table 21. The subdivisions listed in parentheses are the ones in which that herbicide ranked highest.

Table 13. Alphabetized List of Herbicides Used in Weed Control on Federal, State and Private Forest Lands.

General

Ammonium sulfamate (AMS)
Amitrole + Simazine
Atrazine
Atrazine + Dalapon
Cacodylic Acid
Dacthal (DCPA)
Dalapon
Dicamba
Dichlobenil
DSMA
2,4-D
2,4-D + 2,4-DP
2,4-D + 2,4-DP + MSMA
2,4-D + Dicamba
2,4-D + Picloram
2,4-D + Picloram + Triclopyr
2,4-DP (Dichlorprop)
Fosamine
Glyphosate
Glyphosate + 2,4-D
Glyphosate + Simazine
Glyphosate + Sulfometuron methyl
Glyphosate + Triclopyr
Hexazinone
MSMA
Napropamide
Oxyfluorfen
Oryzalin
Picloram
Picloram + Triclopyr
Sethoxydim
Simazine
Sulfometuron methyl
Triclopyr

Site Preparation

Atrazine
Dalapon
Dalapon + Atrazine
Dalapon + 2,4-D + Simazine + Atrazine
Dicamba
2,4-D
2,4-D + 2,4-DP
2,4-D + Picloram
Fosamine
Glyphosate
Glyphosate + Simazine
Hexazinone

Site Preparation (Cont.)

Hexazinone + Atrazine
Picloram
Picloram + Triclopyr
Propazine
Simazine
Sulfometuron methyl
Triclopyr
Triclopyr + 2,4-D

Release

Atrazine
Atrazine + Dalapon
Dicamba
Dichlobenil
2,4-D
2,4-D + Picloram
2,4-DP
Fosamine
Glyphosate
Hexazinone
MSMA
Picloram
Sethoxydim
Simazine
Sulfometuron methyl
Triclopyr
Triclopyr + 2,4-D

Nurseries

Amitrole
Atrazine
Bifenox
Bifenox + Napropamide
DCPA
Diphenamid
2,4-D
2,4-D + Dicamba
EPTC
Glyphosate
Methyl bromide + Chloropicrin
Napropamide
Oxyfluorfen
Paraquat
Picloram
Pronamide
Sethoxydim

Table 13 (Cont.)

Nurseries (Cont.)

Simazine
Sulfometuron methyl
Trifluralin

Christmas Tree Plantations

Ammonium sulfamate (AMS)
Atrazine
Dalapon
2,4-D
2,4-D + Dalapon
Glyphosate
Hexazinone
Oxyfluorfen
Picloram
Simazine

Seed Orchards

Atrazine
2,4-D
Glyphosate
Glyphosate + Triclopyr
Simazine

Thinning

2,4-D
MSMA
Picloram

Table 14. Alphabetized List of Herbicides Used in Range Management on Public lands.

General

Amitrole
Atrazine
Dalapon
Dicamba
2,4-D
2,4-D + Atrazine
2,4-D + Dicamba
2,4-D + Picloram
Diuron
Glyphosate
MCPA
Picloram
Tebuthiuron
Triclopyr

Arid

2,4-D
2,4-D + Dicamba
2,4-D + Picloram
Tebuthiuron

Foothill

2,4-D
Glyphosate
Picloram

Mountain

Dicamba
2,4-D
2,4-D + Dicamba
Glyphosate
Picloram

Rainbelt

None reported

Table 15. Alphabetized List of Herbicides Used in Range Management on Public Lands.

General

Alachlor
Amitrole
Ammonium sulfamate
Atrazine
Benefin
Bentazon
Bromacil
Cacodylic acid
Cyanazine
Dalapon
2,4-D
2,4-D + Bromacil
2,4-D + Dicamba
2,4-D + 2,4-DP
2,4-D + Picloram
2,4-D + Picloram + Triclopyr
Dicamba
Dichlobenil
Diuron
Diuron + Bromacil
Fluometuron
Fosamine
Glyphosate
Hexazinone
Linuron
Metolachlor
MCPA
Oryzalin
Paraquat
Picloram
Prometon
Prometon + Sodium Chlorate + Simazine
Siduron
Simazine
Sodium Metaborate + Sodium Chlorate + Bromacil
Tebuthiuron
Tebuthiuron + Trifluralin
Triclopyr
Trifluralin

Noxious Weed Control

Amitrole
Dicamba
2,4-D
2,4-D + Dicamba
2,4-D + Picloram
Fluazifop-butyl

Noxious Weed Control (Cont.)

Glyphosate
Hexazinone
Methyl benzoate
Nitrofen
Oxyfluorfen
Picloram
Prometon
Sethoxydim

Rights-of-Way Management

Atrazine
Dicamba
2,4-D
2,4-D + Dicamba
2,4-D + 2,4-DP
2,4-D + Picloram
2,4-DP
Diuron + Bromacil
Diuron + Bromacil + Glyphosate
Fosamine
Glyphosate
Glyphosate + Dicamba
Maleic hydrazide
MSMA
Oryzalin
Paraquat
Picloram
Simazine
Tebuthiuron
Triclopyr

Aquatic Areas

Amitrole
Copper sulphate
Dalapon
2,4-D
Diquat
Diuron
Endothall
Glyphosate
Simazine
Sodium Metaborate + Sodium Chlorate + Bromacil

Table 15 (Cont.)

Wildlife Habitat Management	Firebreak Maintenance
Atrazine	Dicamba
2,4-D	2,4-D
2,4-D + Dicamba	EPTC
2,4-D + Picloram	Glyphosate
2,4-DP (Dichlorprop)	Picloram
Fosamine	Trifluralin
Glyphosate	
Hexazinone	
Picloram	
Simazine	
Tebuthiuron	

Table 16. Alphabetized List of Herbicides Used in Cropland Management on Public Lands.

General

Acifluorfen
Alachlor
Alachlor + Dicamba
Atrazine
Benefin
Bentazon
Butylate
Chloramben
Chlorsulfuron
Cyanazine
Cyanazine + Alachlor
Dalapon
Dicamba
2,4-D
2,4-D + Dicamba
Glyphosate
Glyphosate + 2,4-D
MCPA
Metribuzin
Naptalam
Naptalam + Oryzalin
Pendimethalin
Trifluralin

Alfalfa/Hay

2,4-DB
EPTC
Glyphosate + Triclopyr
Hexazinone
Oryzalin
Pronamide

Barley

Barban
Dicamba + MCPA
Diclofop
2,4-D
2,4-D + Dicamba
2,4-D + Diclofop
2,4-DP (Dichlorprop)
2,4-DP + Dicamba
Glyphosate
Glyphosate + 2,4-D
MCPA
Triallate

Beans

Alachlor
EPTC
Trifluralin

Citrus

Bromacil
Dicamba
Diuron
Trifluralin

Corn

Alachlor
Alachlor + Atrazine
Atrazine
Atrazine + Metolachlor
Atrazine + Simazine
Butylate
Butylate + Atrazine
Corn oil
Cyanazine
Cyanazine + Alachlor
Cyanazine + Atrazine
Dicamba
Dicamba + Cyanazine
2,4-D
2,4-D + Atrazine
2,4-D + Dicamba
EPTC
Glyphosate
Glyphosate + Alachlor
MCPA
Metolachlor
Propachlor

Milo

Atrazine
2,4-D
Metolachlor
Propachlor

Oats

2,4-D
2,4-DP
2,4-DP + Dicamba
MCPA

Table 16 (Cont.)

Potatoes

Alachlor
EPTC
Linuron
Metribuzin
Pendimethalin

Rice

Molinate
Propanil
Benthiocarb

Sorghum

Atrazine
Dicamba
2,4-D
Glyhosate
Metolachlor

Soybeans

Acifluorfen
Alachlor
Bentazon
Chloramben
Glyphosate
Linuron
Linuron + Alachlor

Soybeans (Cont.)

Metolachlor
Metribuzin
Metribuzin + Alachlor
Pendimethalin
Sethoxydim
Trifluralin
Vernolate

Vegetables

Bensulide
Metam-sodium
Napropamide
Pebulate
Prometryn

Wheat

Bromoxynil + MCPA
Dicamba
Dicamba + MCPA
2,4-D
2,4-D + Dicamba
Diclofop
2,4-DP
2,4-DP + Dicamba
Diuron
Glyphosate
Triadimefon
Trifluralin

Table 17. Prioritized List of Herbicides Used in Weed Control on Public Lands.

General

Glyphosate
Hexazinone
Picloram
2,4-D + Picloram
Triclopyr
2,4-D
Simazine
Dicamba
Fosamine
Picloram + Triclopyr
Amitrole + Simazine
Ammonium sulfamate
Atrazine
2,4-D + Dicamba
Oxyfluorfen
Sulfometuron methyl
Glyphosate + Simazine
Atrazine + Dalapon
2,4-D + Picloram + Triclopyr
Napropamide
Glyphosate + Triclopyr
Dacthal
2,4-D + 2,4-DP
Glyphosate + Sulfometuron methyl
MSMA
Cacodylic Acid
Dalapon
Dichlobenil
DSMA
2,4-D + 2,4-DP + MSMA
Glyphosate + 2,4-D
Oryzalin
Sethoxydim
2,4-DP

Site Preparation

Glyphosate
Hexazinone
2,4-D
2,4-D + Picloram
Triclopyr
Fosamine
Dalapon
Dicamba

Site Preparation (Cont.)

Dalapon + Atrazine
Simazine
Sulfometuron methyl
Atrazine
Glyphosate + Simazine
Picloram + Triclopyr
Picloram
Dalapon + 2,4-D + Simazine + Atrazine
Propazine
Hexazinone + Atrazine

Release

Hexazinone
Glyphosate
2,4-D + Picloram
2,4-D
Triclopyr
2,4-DP
Dicamba
Atrazine + Dalapon
Sulfometuron methyl
Simazine
MSMA
Sethoxydim
Picloram
Atrazine
Dichlobenil
Triclopyr + 2,4-D

Nurseries

Oxyfluorfen
Glyphosate
Bifenox
Methyl bromide + Chloropicrin
Sethoxydim
DCPA
Simazine
Trifluralin
Napropamide
Diphenamid
2,4-D
Atrazine
Bifenox + Napropamide

Table 17 (Cont.)

Nurseries (Cont.)

Paraquat
Amitrole
Picloram
Pronamide
Sulfometuron methyl
2,4-D + Dicamba
EPTC

Christmas Tree Plantations

Glyphosate
Simazine
Atrazine
Ammonium sulfamate
Hexazinone
Dalapon
2,4-D
2,4-D + Dalapon
Oxyfluorfen
Picloram

Seed Orchards

Glyphosate
2,4-D
Simazine
Sethoxydim
Glyphosate + Triclopyr
Atrazine

Thinning

MSMA
Picloram
2,4-D

Table 18. Prioritized List of Herbicides Used in Range Management on Public Lands.

General

2,4-D
Picloram
Glyphosate
2,4-D + Picloram
Dicamba
2,4-D + Dicamba
Tebuthiuron
Atrazine
Amitrole
Diuron
2,4-D + Atrazine
Dalapon
MCPA
Triclopyr

Arid

2,4-D
2,4-D + Dicamba
Tebuthiuron
2,4-D + Picloram

Foothill

2,4-D
Glyphosate
Picloram

Mountain

2,4-D
2,4-D + Dicamba
Dicamba
Glyphosate
Picloram

Rainbelt

None reported

Table 19. Prioritized List of Herbicides Used in Noncrop Land Management on Public Lands.

General

Glyphosate
Tebuthiuron
2,4-D
Picloram
Sodium metaborate + Sodium chlorate + Bromacil
Tebuthiuron + Trifluralin
2,4-D + Picloram
Ammonium sulfamate
Triclopyr
Bromacil
Atrazine
Diuron
Cyanazine
Alachlor
Dalapon
Fosamine
Simazine
Hexazinone
Metolachlor
Prometon
2,4-D + 2,4-DP
Dicamba
Diuron + Bromacil
Amitrole
2,4-D + Dicamba
2,4-D + Picloram + Triclopyr
Trifluralin
2,4-D + Bromacil
Dichlobenil
MCPA
Paraquat
Prometon + Sodium chlorate + Simazine
Siduron
Bentazon
Cacodylic acid
Benefin
Fluometuron
Linuron
Oryzalin

Noxious Weeds

Picloram
2,4-D
Glyphosate
2,4-D + Picloram

Noxious Weeds (Cont.)

Dicamba
2,4-D + Dicamba
Amitrole
Hexazinone
Methyl benzoate
Oxyfluorfen
Sethoxydim
Fluazifop-butyl
Nitrofen
Prometon

Rights-of-way

Fosamine
2,4-D
2,4-D + Picloram
Tebuthiuron
2,4-D + 2,4-DP
Triclopyr
2,4-D + Dicamba
Picloram
Atrazine
Dicamba
2,4-DP
Diuron + Bromacil
Glyphosate + Dicamba
Paraquat
2,4-D + Dalapon
Glyphosate
Oryzalin
MSMA
Simazine
Diuron + Bromacil + Glyphosate
Maleic hydrazide

Aquatic Areas

Glyphosate
Endothall
Diquat
2,4-D
Dalapon
Copper sulphate
Sodium metaborate + Sodium chlorate + Bromacil
Amitrole
Simazine
Diuron

Table 19 (Cont.)

Wildlife Management Areas	Firebreaks
Picloram	Picloram
Glyphosate	Trifluralin
2,4-D	EPTC
2,4-D + Picloram	Dicamba
Hexazinone	2,4-D
Simazine	Glyphosate
2,4-DP	
2,4-D + Dicamba	
Fosamine	
Tebuthiuron	

Table 20. Prioritize List of Herbicides Used in Cropland Management on Public Lands.

General

Atrazine
Trifluralin
2,4-D
Glyphosate
Bentazon
Alachlor
2,4-D + Dicamba
Metribuzin
Naptalam
Alachlor + Dicamba
Chloramben
MCPA
Chlorsulfuron
Cyanazine + Alachlor
Dalapon
Dicamba
Naptalam + Oryzalin
Acifluorfen
Cyanazine
Glyphosate + 2,4-D
Pendimethalin
Butylate
Benefin

Alfalfa/Hay

Metribuzin
2,4-DB
Hexazinone
Glyphosate + Triclopyr
EPTAM
Pronamide
Oryzalin

Barley

2,4-D
Triallate
Glyphosate
MCPA
Barban
Dicamba + MCPA
2,4-D + Dicamba
2,4-DP
Diclofop
Dichlorprop + Dicamba
2,4-D + Diclofop
Glyphosate + 2,4-D

Beans

Alachlor
Trifluralin
EPTC

Citrus

Trifluralin
Bromacil
Diuron
Dicamba

Corn

Atrazine
Alachlor
2,4-D
Alachlor + Atrazine
Cyanazine
EPTC
Glyphosate
Atrazine + Metolachlor
Dicamba
Metolachlor
Butylate
Cyanazine + Atrazine
2,4-D + Atrazine
2,4-D + Dicamba
Butylate + Atrazine
Dicamba + Cyanazine
Corn oil
Cyanazine + Alachlor
Glyphosate + Alachlor
Atrazine + Simazine
Propachlor
MCPA

Milo

Atrazine
2,4-D
Metolachlor
Propachlor

Oats

2,4-D
2,4-DP
2,4-DP + Dicamba
MCPA

Table 20 (Cont.)

Potatoes

Metribuzin
Alachlor
Linuron
Pendimethalin
EPTC

Rice

Propanil
Molinate
Benthiocarb

Sorghum

Atrazine
2,4-D
Glyphosate
Dicamba
Metolachlor

Soybeans

Bentazon
Trifluralin
Alachlor
Gylphosate
Metribuzin
Sethoxydim
Linuron + Alachlor

Soybeans (Cont.)

Pendimethalin
Vernolate
Acifluorfen
Chloramben
Metolachlor
Linuron
Metribuzin + Alachlor

Vegetables

Napropamide
Pebulate
Prometryn
Bensulide
Metam-sodium

Wheat

2,4-D
Dicamba
Dicamba + MCPA
Diclofop
2,4-D + Dicamba
Dichlorprop
Trifluralin
Dichlorprop + Dicamba
Diuron
Glyphosate
Bromoxynil + MCPA
Triadimefon

Table 21. Ten Highest Ranked Herbicides[1] in Each of the Four Major Federal/State Land Management Categories.

Category	Herbicide and Subdivision [2]
Forestry	Glyphosate (General, Site Preparation Nurseries)
	Hexazinone (General, Release)
	Oxyfluorfen (Nurseries)
	2,4-D (Site Preparation, Release)
	Picloram (General)
	2,4-D + Picloram (General, Site Preparation, Release)
	Triclopyr (Site Preparation)
	Bifenox (Nurseries, General)
	Methyl bromide + Chloropicrin (Nurseries)
	Sethoxydim (Nurseries)
Range	2,4-D (General, Foothill, Arid)
	Picloram (General, Foothill, Mountain)
	Glyphosate (General, Foothill, Mountain)
	2,4-D + Picloram (General, Arid)
	Dicamba (General, Mountain)
	2,4-D + Dicamba (General, Mountain, Arid)
	Tebuthiuron (General, Arid)
	Atrazine (General)
	Amitrole (General)
	2,4-D + Atrazine (General)
Noncrop Areas	Glyphosate (General, Aquatic, Wildlife Management, Noxious Weeds)
	Tebuthiuron (General)
	2,4-D (General, Noxious weeds, Aquatic, Wildlife Management, Rights-of-Way)
	Picloram (General, Noxious Weeds, Wildlife Management)
	Sodium metaborate + sodium chlorate + Bromacil (General)
	Tebuthiuron + Trifluralin (General)
	2,4-D + Picloram (General, Noxious Weeds, Wildlife Management)
	Endothall (Aquatic)
	Diquat (Aquatic)
	Fosamine (Rights-of-Way)
Croplands	Atrazine (Corn, General)
	2,4-D (Wheat, General)
	Trifluralin (General, Soybeans)
	Glyphosate (General, Soybeans)
	Alachlor (Corn, Soybeans)
	Bentazon (Soybeans, General)
	Alachlor + Atrazine (Corn)
	Dicamba (Wheat)
	Cyanazine (Corn)

[1]Highest ranked herbicides in order of priority were determined by those ranking highest in combined trend and priority when all subdivisions in the category were considered.

[2]The subdivision(s) in which the named herbicide ranked highest.

ASSESSMENT OF WEED CONTROL TECHNOLOGY

The third section of the weed survey (Figure 1) requested information on seven techniques: (1) conservation tillage, (2) no-till, (3) mechanical, (4) cultural, (5) chemical, (6) biological, and (7) integrated weed management.

Respondents were requested to supply the percentage of acres under their management where each of these techniques was used. Because of the variety of management practices, the number of category subdivisions and differences of interpretation of acreages under management, however, no meaningful evaluation could be made; so data on percentage of acreage have not been included in this report.

Respondents were also asked to rate each of the techniques on a scale of 1 to 10, 1 indicating the least or no need for improved technology in that technique, a 10 indicating the greatest or urgent need for improvement in technology.

These data were summarized in the following manner. In each subdivision, the ratings for needed improvement in each technique were added together and divided by the number of respondents. This gives an average need for improvement in each technique as seen by the respondents. In Table 22, this is shown by two numbers separated by a dash; the number before the dash is theaverage of the ratings for that technique in that subdivision; the number after the dash is the total number of respondents for that technique in that subdivision.

It should be noted that a number of respondents rated "conservation tillage" and "no-till" as techniques in general forestry and in other subdivisions that may seem unlikely. These figures undoubtedly reflect a very broad definition of the technique to indicate the least disturbance of soil and the maximum retention of surface residue. The terms, in that sense, do not relate to the specific practices of the same names in agronomic crop production.

Two kinds of data emerged from the survey of current techniques and needs for improved technology: highest average ratings, and number of respondents supplying a rating. In general forestry, respondents indicated the greatest needs for better technology in chemical, biological, and integrated pest management techniques. Each of these averaged a rating of 7 on the scale of 1 to 10. Average ratings of 7 were also given to improved IPM for site preparation and release. Christmas tree growers indicated a need for improved weed control technology with regard to cultural (8), biological (10), and IPM (8) techniques. The greatest number of respondents indicated needed improvements in the areas of mechanical (128) and chemical (124) controls.

The survey form also provided space for respondents to indicate needs in addition to the seven listed. Among the additional needs listed were improved application equipment, better chemical formulations (i.e., granular and slow release), and greater safety measures. Several respondents also indicated a need for improvement in informing the public about weed control and herbicide use.

Table 22. Assessment of Need[1] for Better Weed Control Technology

Category and Subdivision	Weed Management Technique						
	Conservation[2] Tillage	No Till[3]	Mechanical[4]	Cultural[5]	Chemical[6]	Biological[7]	IPM[8]
Forestry							
General	3-18	3-19	5-34	4-18	7-36	7-17	7-24
Site Preparation	1-1	3-4	5-28	4-8	6-27	1-2	7-7
Release	1-1	4-3	4-29	6-5	6-29	1-1	7-7
Thinning	1-1	1-1	2-19	0-0	3-6	1-1	3-2
Seed Orchards	1-1	1-1	5-3	3-2	4-6	1-1	5-2
Christmas Trees	8-1	1-1	3-1	8-1	5-2	10-1	8-2
Nurseries	3-8	3-8	4-14	4-13	5-18	4-8	5-15
Total[9]	**31**	**37**	**128**	**47**	**124**	**31**	**59**
Range							
General	4-4	4-4	3-13	5-15	6-17	9-17	6-15
Arid	1-2	1-2	5-2	3-3	4-5	5-3	6-3
Foothill	6-3	1-1	5-3	5-3	3-3	1-1	5-1
Mountain	6-3	4-3	4-4	5-4	3-4	3-2	5-2
Rainbelt	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Total	**12**	**10**	**22**	**25**	**29**	**23**	**21**
Noncrop							
General	3-9	2-9	2-45	4-15	2-77	7-32	5-27
Aquatic	1-1	1-1	3-6	3-5	5-19	8-6	6-9
Firebreaks	1-1	1-1	4-1	1-1	5-2	1-1	5-1
Lawns	0-0	0-0	1-4	0-0	3-6	0-0	5-2
Noxious Weeds	6-3	1-1	3-5	5-9	5-12	9-6	7-8
Ornamentals	0-0	0-0	0-0	0-0	2-1	0-0	0-0
Pastures	0-0	0-0	1-2	1-1	5-1	0-0	3-3
Rights-of-Way	0-0	0-0	4-11	4-5	4-11	5-4	6-4
Wildlife Areas	3-1	3-1	3-12	2-13	4-15	3-1	6-2
Total	**15**	**13**	**86**	**49**	**144**	**50**	**56**
Cropland							
General	4-9	4-8	2-9	2-10	4-12	7-7	4-10
Alfalfa/Hay	2-3	1-1	1-2	5-2	6-5	4-2	1-1
Barley	4-5	3-5	2-6	2-4	3-6	4-4	3-5
Beans	0-0	0-0	1-1	1-1	5-2	5-1	5-1
Citrus	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Corn	5-12	4-12	3-11	4-12	5-15	5-8	4-15
Milo	5-2	5-2	2-2	2-2	3-3	3-2	3-2
Oats	3-2	3-2	1-3	2-2	3-3	3-2	3-2
Potatoes	0-0	0-0	0-0	0-0	6-2	0-0	1-1
Rice	5-2	4-2	1-1	1-1	2-1	5-1	5-2
Sorghum	4-3	4-3	3-2	3-2	3-3	8-3	4-2
Soybeans	5-6	4-5	4-7	5-6	4-8	4-5	4-6
Vegetables	0-0	0-0	0-0	0-0	5-1	0-0	0-0
Wheat	5-12	6-11	4-12	5-11	6-14	4-16	5-12
Total	**56**	**51**	**56**	**53**	**75**	**51**	**59**

[1] Each respondent to the survey indicated needs for better technology on a scale of 1 to 10 (1= not necessary; 10= urgent). The numbers preceding the dash (-) in each column represent the average of all responses for that technique in that subdivision. The numbers following the dash (-) are the number of respondents.

[2] Conservation tillage minimizes soil disturbance and leaves surface residues.

[3] No till practices avoid soil disturbance from harvest to next planting.

[4] Mechanical practices use cultivators, mowers, brush cutters, etc.

[5] Cultural practices include fertilization, grazing, and prescribed burning.

[6] Chemical practices use conventional herbicides.

[7] Biological practices include the use of parasites, predators, and pathogens.

[8] Integrated pest management is the combined use of two or more weed control techniques.

[9] The number of respondents indicating needs for better technology for each technique.

Rangeland managers gave top priority (average of 9) to improvements needed inthe technology of biological control. The greatest number of range management respondents (29) reported needed improvements in chemical controls.

General noncrop-, aquatic-, and noxious-weed control personnel reported their greatest needs (averages of 7, 8, and 9 respectively) for improved technology are in the area of biological control. However, the greatest number (144) ofrespondents reported that better chemical controls are needed.

Similarly, cropland managers reported highest needs (average of 7) for improvements in biological control but a greater number (75) reported there were needs for improved chemical control technology.

Overall, the highest average need for better technology in forestry, range and noncrop weed management was for integrated pest management. The subdivision average for these activities on the 1 to 10 scale of need for better technology were 6, 6, and 5 respectively.

CONCLUSIONS

Forests and rangelands in the U.S. cover some 1.5 billion acres and for the foreseeable future weeds, trees and herbicides will all continue to be important elements in their management. To determine the current extent of weeds on these lands, to evaluate practices now in use and to estimate future trends of both, a survey of forest and rangeland management personnel was undertaken. From that survey we conclude that in forestry, weeds such as grasses, ceanothus, purslane, bindweed, alder, nutsedge, kudzu, pigweed, leafy spurge and Canadian thistle are going to continue to be of significance because of their current infestation patterns and the difficulty they present in being controlled. As a result, forest managers involved with site preparation, release, nursery management and general forestry want improved technology to aid in their vegetation management programs. Newer herbicides like glyphosate, hexazinone, oxyflourfen, and triclopyr and old stand-bys like 2,4-D and picloram are important in forest managers' fight against these weeds, but newtechnology is being requested in the form of better chemical, biological, andintegrated pest management techniques.

Rangeland managers are likely to continue to be plagued by leafy spurge, thistles, knapweeds, rabbitbrush and tansy ragwort. Several of these have been declared "noxious" by various state leagislatures, and pressure to control them will likely increase. Use of herbicides such as 2,4-D, picloram, gylphosate, dicamba, tebuthiuron and combinations of them are expected to remain at current levels with some upward trends. New technology is desired especially with regard to biological controls. Combinations of techniques in integrated weed management programs are also highly desired.

A variety of noncropland management areas are associated with public lands. The most undesirable weeds and trees identified by survey respondents include: sassafras, persimmon, Canadian thistle, kudzu, Johnsongrass, and leafy spurge. These and other types of undesirable vegetation are expected to continue to hamper public land managers reponsible for maintenance of noncrop public land areas.

Cropland management is not a primary goal on public lands, but where crops are grown to enhance wildlife habitat or maintain historic settings, weeds such as Johnsongrass, cocklebur, bindweed, cheatgrass, foxtail, velvetleaf, and Canadian thistle have resisted attempts to control them. Even with important herbicides like atrazine, 2,4-D, trifluralin, glyphosate, and alachlor in crops like corn, wheat, and soybeans, these weeds persist. Some even show an upward trend in infestation pattern. Consequently public land managers would like improvements in their cropland weed control techniques. Technological improvements are especially indicated in the areas of chemical and biological controls.

Overall, respondents indicated that improvements are needed in the management of weeds and trees, and in the availability and use of herbicides. This summary is intended to provide a source of information that will be useful for establishing future priorities for short- and long-term research planning and for implementing research, development, regulatory, and educational programs related to weeds, trees, and herbicides.

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